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## Trust as state capacity: The political economy of compliance

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WIDER Working Paper 2022/135

## **Trust as state capacity**

The political economy of compliance

Timothy Besley<sup>1</sup> and Sacha Dray<sup>2</sup>

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**Abstract:** This paper explores the link between trust in government, policy-making, and compliance. It focuses on a specific channel whereby citizens who are convinced that a policy is worthwhile are more motivated to comply with it. This in turn reduces the government's cost of implementing a policy and may also increase the set of feasible policies. Thus, state capacity is greater when citizens trust their government. The paper discusses alternative approaches to modelling the origins of trust, especially the link to the design of political institutions. We then provide empirical evidence consistent with the model's findings that compliance is increasing in trust using the Integrated Values Survey and voluntary compliance during COVID-19 in the UK. We also show that countries with high levels of citizen trust in government were more likely to implement policies requiring voluntary compliance during the COVID-19 pandemic. The paper suggests that trust in government can play a role in building and expanding state capacities.

**Key words:** state capacity, trust, government, compliance, political economy

**JEL classification:** D72, E61, H11, P11

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## 1 Introduction

There is now consensus that government effectiveness is important in promoting growth, development and well-being. This has created a large and growing literature exploring the origins and determinants of effective states. One of the central challenges remains to understand why some states have made progress, in particular by developing welfare states with modern tax, legal and regulatory systems able to support a functioning market economy, while others have failed to do so.

A common theme in understanding effective states has been the need to build a sense of cohesion to facilitate the creation of functioning state institutions. And there is consensus that inclusive institutions in the sense of Acemoglu and Robinson (2012) have a role to play. Besley and Persson (2009, 2011) showed how these relate to incentives to invest in state capacities. They envisaged this process as akin to investing in infrastructure to support state effectiveness. There are many concrete examples. A viable system of tax collection requires recruiting and training a cadre of honest and competent bureaucrats. Building a legal system requires laws to be written, judges to be appointed, courts to be resourced and regulatory structures to be put in place. Effective infrastructure building is unlikely to happen without a proper evaluation process for spending wisely and effectively. Many of these investments are intangibles, i.e. designing and implementing organizational structures where accountable expertise is brought to bear. So structures for recruiting, monitoring and evaluating professional service staff may play a key role.

The economic approach has been more circumspect in embracing the role of cultural and sociological factors in supporting the process of building effective states. However, this has been a mainstream theme in political science with landmark contributions by Levi (1989, 1997) and Putnam et al. (1993). Moreover, such ideas are now being integrated into economic approaches, for example Acemoglu and Robinson (2019) and Besley (2020).

These two ways of thinking about the origins of effective states have parallels in two broad historical traditions where thinkers have grappled with problems of creating a viable political order. The first is associated with thinkers like Hobbes (1651) and Weber (1919) and emphasizes the projection of state power with a focus on coercive authority where the state has a monopoly of legitimate use of force. This is supported with a range of investments in coercive compliance to underpin state effectiveness and this is achieved in part by improving detection and punishment of those who transgress against the law. Constraints on power can play a role in ensuring that the government uses its coercive authority to serve the public interest. The second tradition is rooted in the works of thinkers such as Locke (1690) and Rousseau (1762) who see the state as a form of social contract in which citizens and states have mutual obligations. Building trust is the key to state effectiveness as a means of encouraging voluntary compliance with taxes, laws, rules and regulations for the ‘common good’.

The role of trust in government is emphasized in this second tradition. And this paper explores a specific aspect of this and studies the role of trust in increasing compliance and building state capacity. It focuses on situations where state action has two key elements.

First, the state has better information about what is needed compared to citizens due to its ability to draw on expertise. However, the state can abuse this informational advantage by misleading citizens to further its private interests knowing that citizens do not have the full picture. This leads to a principal agent problem which has to be solved. For the state to be trusted, there has to be faith that it will pursue the common good rather than private interests.

The second element is the need for supportive action by citizens to increase policy effectiveness. For example, the state works more effectively when citizens pay their taxes and follow regulations. We consider a world where citizens are motivated to comply as long as they perceive their actions to be

serving the common good. But when the state is not trusted, they may not be sure that policy is indeed justified, and hence doubt that compliance with it is the right thing to do. Hence, even if there is a well of potential support for policies, governments that lose the trust of their citizens may struggle to get things done if they have to resort to coercive rather than voluntary compliance.

This paper puts forward a canonical model of such policy situations and studies the interplay between policy and public action in generating effective state intervention. The importance of these issues was illustrated by the recent COVID-19 pandemic where many measures recommended by the state were only effective if citizens chose to comply. Purely coercive compliance with lockdowns was not an option for many states and so required that citizens understood the case for a lockdown and complied voluntarily. Requests to wear masks, socially distance and get vaccinated also had large elements of voluntary compliance. This was arguably facilitated by having greater trust that these were the right policies.<sup>1</sup> In terms of future policy challenges, the need for costly lifestyle changes to respond to the threat of climate change has some similar features. Unless citizens trust in the actions that they are being asked to undertake, it may limit the effectiveness of policy responses and therefore whether policies are actually implemented.

This approach allows us to interpret trust as a form of state capacity. In situations of high trust, the state will be able to get more things done at a lower cost. And this naturally means focusing on ways of increasing trust.

The remainder of the paper is organized as follows. In the next section, we relate the ideas in this paper to the large literature on political trust and state capacity. We also discuss the underpinnings of pro-sociality which play a role in the modeling framework. Section 3 develops the core model along with a number of extensions. Section 4 links the model to the origins of trust in government and Section 5 uses the model to discuss the relationship between trust and state capacity. Finally, Section 6 discusses the empirical implications of the ideas and Section 7 contains some concluding comments.

## 2 Background

This paper is related to three literatures in political economy: the study of political trust, implications of pro-social behaviour and building state capacity.

**Political trust** There is now a voluminous literature on political trust surveyed in Levi and Stoker (2000). It is backed by a large amount of survey data with Gonzales and Smith (2017) looking at different sources across OECD countries. Although patterns of interpersonal trust and trust in government have some common features, they do not always move together. Long-run survey data for the USA, in particular, have generated a fierce debate about the causes and consequences of the decline in trust (see, for example, Hetherington 2005 and Nye et al. 1997).

There are two core issues when it comes to thinking about trust. The first is what drives trust and the second is what trust affects. However, this framing does an injustice to what is likely to be a complex dynamic process of two-way causality (Hetherington 1998).

Schoon and Cheng (2011) note that views about the origins of trust follow two distinct approaches. The first is a focus on the role of institutions in driving trust. So if trust comes from perceptions of political behaviour by elites, then, if institutions can constrain behaviour, this is likely to help in building trust. Hardin (2006), for example, espouses such an institutionalist view of trust. This links trust to political

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<sup>1</sup> See Trent et al. (2022) for evidence on vaccine hesitancy.

agency models of the kind surveyed in Besley (2006). Here, the equilibrium behaviour of politicians depends on the way in which they are held to account by voters, which depends on things such as media activity. These issues are explored in an online experiment by Martinez-Bravo and Sanz (2022).

The second approach sees trust more through the eyes of cultural factors, i.e. trust in government is akin to values that individuals hold. Such ideas are explored writ large in Inglehart (2020) using patterns in the World Values Survey. This largely focuses on the idea that values are transmitted between generations and are slow moving. However, there is acceptance of the idea that key events in formative years can make a difference to the level of trust. Schoon and Cheng (2011) look at how trust in government changes over time in response to life time events such as living under a communist dictatorship; Mischler and Rose (2001) explore the interplay of cultural and institutional factors in explaining low levels of political trust in the post-communist regimes of Eastern Europe.

When it comes to the consequences of trust, there are arguments that it is linked to low levels of political turnout, such as Timpone (1998). Levi (1997) stresses the importance of trust as a factor linked to willingness to volunteer for military service. Martinez-Bravo and Stegman (2021) link trust to the acceptance of vaccinating children, and Bargain and Aminjonov (2020) show that reduced mobility is correlated with trust across countries. Psychological accounts of willingness to obey the law are frequently linked to trust as argued by Tyler (2006). This ties to wider debates about how trust and state legitimacy are linked as discussed, for example, in Levi et al. (2012).

**Compliance and pro-social behaviour** A key part of the mechanism in this paper is that citizens are motivated to comply with policies when they are convinced that they are doing the right thing. Thus, this paper links to the large literature on pro-social behaviour which goes beyond the traditional view that material incentives are the main, or even the only, tool for fostering compliance. Some different ways of looking at this have emerged in the literature and it is useful to locate this paper among these approaches.<sup>2</sup>

Consider a world where compliance with policies is costly but there are collective benefits from aggregate compliance. No single individual can affect the social benefits, so some kind of private utility from pro-social actions is needed to motivate compliance. Andreoni (1990) called such motivation ‘warm glow altruism’ but without giving it any kind of specific micro-foundation.

One approach to pro-social motivation developed in Akerlof and Kranton (2005, 2010) is to suppose that people adopt social identities which are associated with particular patterns of behaviour. In our context, we could imagine that people have a notion of what it means to be a good citizen, which would include complying with reasonable requests by the state to pay taxes and obey laws.

A second approach views pro-social behaviour as having a reputational foundation. Individuals may choose to signal to themselves or others that they are willing to prioritize pro-social behaviours since they are deemed valuable. And such signals are more credible when they are privately costly. Bénabou and Tirole (2003, 2006) develop an approach along these lines. Then, costly compliance would be possible if there is a sufficient signalling benefit.

The third approach is to imagine that citizens have mission-driven preferences. They will then comply with actions which are consistent with a mission that they approve so that they have private returns to costly actions. This approach is developed in Besley and Ghatak (2005) who show that matching agents to missions economizes on the need for material incentives.

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<sup>2</sup> Besley and Ghatak (2018) review the literature.

None of these approaches have yet been linked to trust in government. However, as we shall see below, if compliance is with policies, then these kinds of pro-social motivation may be enhanced when citizens trust the government to be making a reasonable sacrifice. Then, this looks like good citizenship, which can enhance signalling benefits and/or be consistent with a mission that merits enhancing values which are pro-social.

**State capacity** State capacities are what enable states to get things done and can be modeled as increasing the feasible set of policies available to government as well as permitting existing policies to be delivered at lower costs/more effectively. It is inherently multi-dimensional with at least three core dimensions. Fiscal capacity refers to how well the state can raise revenues. Legal capacity refers to the ability to enforce laws and to regulate citizens and the economy. Collective capacity refers to the capacity of the state to spend money in ways that generate value to citizens in the form of public services and infrastructure. Such capacities have evolved through history and vary enormously across countries.

Interest in these issues by economists is relatively recent but there is a large literature in economic history, political science and historical sociology. Two of the historical classics are Hintze (1906) and Schumpeter (1918). The former is well known for invoking the importance of warfare as a driver of fiscal capacity, a theme later taken up in classic work by Tilly (1990). Historians such as Brewer (2002) and O'Brien (1988) have stressed the role of empire building and establishing naval power as a driver of British fiscal development starting in the early modern period. The seminal work in political science is Levi (1989), and Dincecco (2015) discusses a range of political economy factors in the context of European history.

The conventional view of how state capacity is built is developed in Besley and Persson (2009, 2011). Investments can be thought of as a form of intangible capital rather than 'bricks and mortar' infrastructure. Thus changes in the way that the state is organized are important determinants of the professionalization process that has taken place to allow the state a wider remit. This ties into wider themes in the work of sociologists such as Weber (1919). State capacity investment can be thought of as an investment problem where a key issue is how such capacities are deployed in future. Strong institutions constrain private interests and encourage the state to be used as a tool for pursuing common interests. This creates an environment that is conducive to building state capacities, and a range of correlational evidence is supportive of this idea.

Shifting culture can also be a way of building state capacity as citizens develop a sense of obligation. This mirrors the idea that successful states build a social contract between the state and the citizen. This idea is key to Levi (1989) who argued that quasi-voluntary compliance plays a key role in the increase in the power to tax through history. This dovetails with a wider theme in political science about the role of civic culture in establishing functioning polities, with Almond and Verba (1963) being a classic reference on the importance of building civic cultures in making polities functional. Putnam et al. (1993) study the importance of civic engagement in explaining heterogeneity in government performance. Besley (2020) formalizes the idea that the evolution of reciprocity can play a role in the pattern of state evolution.

### 3 Theoretical framework

This section develops a model with some core features that link trust and compliance. In the model, governments choose whether to implement a costly policy, but face limited enforcement capacity and therefore need citizens to want to adhere to it. Citizens are more motivated to comply if they are convinced that the policy is worthwhile, i.e. they have some element of pro-social motivation. When a policy is introduced, trust in government determines the likelihood that the policy is welfare enhancing

and hence affects their compliance decision. But this feeds back onto whether the government chooses to implement the policy in the first place.

### 3.1 The model

**Basics** Government chooses whether to introduce a policy denoted by  $\lambda \in \{0, 1\}$  where  $\lambda = 1$  denotes going ahead with the policy. The policy has a cost per capita of  $C$  which we assume is borne equally by all citizens. Whether the policy is successful depends on the state of the world denoted by  $\theta \in \{0, 1\}$ . Specifically, the policy yields a per capita payoff of  $\Delta > 0$  if  $\theta = 1$  and yields a per capita loss of  $-\delta$  where  $\delta > 0$ , if  $\theta = 0$ . If  $x \in [0, 1]$  is the probability that  $\theta = 1$ , then

$$\hat{\Delta}(x) = x\Delta - (1-x)\delta, \quad (1)$$

is the expected payoff associated with putting the policy in place.

There is a continuum of citizens indexed by  $i \in [0, 1]$  with a uniform distribution of costs of complying with the policy if introduced, i.e. the cost is  $iE$  where  $E > \Delta$ . If they fail to comply, then they face an expected cost of  $\varphi (\geq 0)$ , which we interpret as the coercive power of the state (e.g. a fine). As we discussed above, having more power to coerce is one way of thinking about greater state capacity. For now  $\varphi$  is fixed but it will become endogenous below.

In addition to sanctions, citizens are also pro-social and the cost can be partially offset if they are convinced that the policy is needed. To reflect this, their payoff is  $\hat{\Delta}(\pi) - iE$  if they comply where  $\pi$  denotes the citizens' (common) belief that  $\theta = 1$ . As we discussed above, this form of motivation could come from citizens being willing to engage in pro-social acts to enhance their reputation or self-image as in Bénabou and Tirole (2006), or from citizens getting mission-oriented utility where they identify with the role of the state if they perceive the state to be acting in the public interest as in Besley and Ghatak (2005). For simplicity, we assume that all citizens have the same level of motivation to comply; an extension to having a population with heterogeneous levels of motivation would be straightforward.

We will assume throughout that government observes  $\theta$  but citizens do not. Citizens will update their beliefs about the state of the world by observing government policy.<sup>3</sup>

**Compliance** If  $\lambda = 1$ , then citizen  $i$ 's compliance decision is denoted by  $\varepsilon(i) \in \{0, 1\}$  where  $\varepsilon(i) = 1$  denotes complying with the policy. We suppose that citizens care about whether the policy is worthwhile or not, thus caring directly about  $\hat{\Delta}(\pi)$ . The payoff of citizen  $i \in [0, 1]$  is therefore

$$\varepsilon(i) [\hat{\Delta}(\pi) - iE] - (1 - \varepsilon(i))\varphi. \quad (2)$$

Thus  $\varepsilon(i) = 1$  if and only if

$$\frac{\hat{\Delta}(\pi) + \varphi}{E} \geq i, \quad (3)$$

and the fraction of citizens who comply is therefore

$$\hat{\rho}(\pi, \varphi) = \max \left\{ 0, \min \left\{ \frac{\hat{\Delta}(\pi) + \varphi}{E}, 1 \right\} \right\}, \quad (4)$$

which is (weakly) increasing in coercive power,  $\varphi$ , and the belief that the state is  $\theta = 1$ , i.e.  $\pi$ . Equation (4) includes the possibility of corner solutions with either full compliance or no compliance.

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<sup>3</sup> This will be the *only* source of information on  $\theta$ . But in richer models, there could also be independent information sources from media reports, think tanks, etc.



Let

$$\hat{E}(\pi, \varphi) = \frac{E \times \hat{\rho}(\pi, \varphi)^2}{2} + \varphi(1 - \hat{\rho}(\pi, \varphi)) \quad (5)$$

be the aggregate level of compliance costs. Such costs matter to a benevolent government, i.e. one that cares about both the benefits and costs of intervention.

**Government** As in many political agency models (see Besley 2006), there are different types of government. Here, we use the labels  $\tau \in \{t, u\}$  where  $t$  stands for ‘trustworthy’ and  $u$  for ‘untrustworthy’ government. The ex-ante probability that a government is trustworthy is denoted by  $\gamma \in [0, 1]$ .

Let

$$W(\varphi, \hat{\rho}(\pi, \varphi) : \theta) = \rho \hat{\Delta}(\theta) - \hat{E}(\pi, \varphi) - C \quad (6)$$

be social welfare if the policy is implemented. The first term is the proportion of compliers times the value of the policy. The second is the compliance cost comprising the utility cost of coercive measures taken by the state and the private disutility of compliance. The expression in (6) has a paternalistic element since the government knows  $\theta$  which may not be known to citizens. Note, however, that because compliance matters, the citizens’ beliefs about policy matter. Since  $\Delta(0) < 0$ , the policy is welfare enhancing only if  $\theta = 1$ . However, there has to be sufficient compliance for the policy to go ahead as we shall see below.

We will work with the case where

$$W(\varphi, \hat{\rho}(1, \varphi) : 1) > 0, \quad (7)$$

for all  $\varphi \geq 0$ , i.e. the policy is always worthwhile when  $\theta = 1$  if the government is fully trusted.

We model untrustworthy government in a simple way by supposing that such policy-makers are motivated by concerns other than citizen welfare. For the ‘warm glow’ utility of  $\Omega$  from setting  $\lambda = \theta$ , but a ‘rent’ of  $r \in [-R, R]$  from setting  $\lambda = 1$ . The rent  $r$  is drawn from a symmetric mean-zero distribution with cdf  $G(\cdot)$ . Then the choice of  $\lambda$  maximizes

$$\lambda r + \Omega[1 - |\lambda - \theta|]. \quad (8)$$

Then if  $\theta = 1$ ,  $\lambda = 1$  if and only if  $r \geq -\Omega$  and if  $\theta = 0$ ,  $\lambda = 1$  if and only if  $r \geq \Omega$ . Thus  $\beta = G(\Omega) > 1/2$  is the probability of getting  $\lambda = 1$  if  $\theta = 1$  (using the symmetric distribution of  $G$ ), and  $1 - \beta$  is the probability of getting  $\lambda = 1$  if  $\theta = 0$ . Note that if  $\Omega > R$ , then  $\beta = 1$ , so even an intrinsically untrustworthy government would choose  $\lambda = \theta$  always. But then the distinction between the two types of government becomes irrelevant, so we focus on the case where  $G(\Omega) < 1$ .

**Timing** The timing of the model is as follows:

1. Nature determines  $\theta \in \{0, 1\}$ ,  $r \in [-R, R]$  and  $\tau \in \{t, u\}$ . Citizens have prior belief  $\pi$  that  $\theta = 1$ .
2. The government chooses  $\lambda$ .
3. For  $\lambda \in \{0, 1\}$ , citizens update their belief that  $\theta = 1$  to  $\Pi^\lambda(\gamma)$  using Bayes’ rule and then choose whether to comply with the policy.
4. Payoffs are realized.

We solve the model backwards looking for subgame perfect Bayesian equilibria.

### 3.2 Equilibrium compliance and policy choice

**Compliance** Citizens understand that an untrustworthy government sets  $\lambda = 1$  with probability  $\beta$  and use Bayes rule to update their beliefs after observing  $\lambda$ . If they observe that  $\lambda = 1$ , then the probability that  $\theta = 1$  is given by

$$\hat{\Pi}^1(\gamma) = \frac{[\gamma + (1 - \gamma)\beta]\pi}{\gamma\pi + (1 - \gamma)[\pi\beta + (1 - \pi)(1 - \beta)]}. \quad (9)$$

It is straightforward to check that  $\hat{\Pi}^1(\gamma)$  is increasing in  $\gamma$  with

$$\hat{\Pi}^1(0) = \underline{\pi} \equiv \frac{\beta\pi}{\pi\beta + (1 - \pi)(1 - \beta)} \in [\pi, 1]$$

and  $\hat{\Pi}^1(1) = 1$ . Compliance is therefore given by

$$\hat{\rho}(\hat{\Pi}^1(\gamma), \varphi) = \max \left\{ 0, \min \left\{ \frac{\hat{\Delta}(\hat{\Pi}^1(\gamma)) + \varphi}{E}, 1 \right\} \right\}, \quad (10)$$

which is also increasing  $\gamma$  when there is an interior solution. Thus, we have

**Proposition 1** *Compliance with policy is increasing in trust in government.*

This is a key feature of the model and mirrors the kind of ideas developed in the work of Levi (1989, 1997) where it is possible to have voluntary compliance under the right conditions. Here, the mechanism that drives citizens' willingness to comply is that the government is perceived to be implementing policies that they believe are welfare enhancing. However, they do not observe this directly and have to infer this from the actions of government coupled with their belief that the government is acting to maximize welfare. If government is trustworthy, then it will only choose policies that are welfare enhancing.

This is a result on aggregate compliance, but it also holds at the individual level with each individual being more likely to comply if  $\gamma$  goes up. One feature of the model is that the decision to comply does not depend on coercion. So if  $\hat{\Delta}(\hat{\Pi}^1(\gamma)) > 0$ , then there are some individuals for whom  $\varphi < iE$  but who nonetheless comply. But equally there are some individuals who comply only if  $\varphi > 0$ , i.e.  $\hat{\Delta}(\hat{\Pi}^1(\gamma)) < iE$ . So the model gives a precise sense of what it would mean to have 'quasi-voluntary' compliance in the sense of Levi (1989).

**Equilibrium policy** We now explore the interaction between policy choice and trust. We have already observed that an untrustworthy government picks policy based on  $r$  rather than  $\theta$ . But even a welfare-maximizing (trustworthy) government cares about  $\gamma$  because this affects compliance. The following result characterizes the behaviour of a trustworthy government.

**Proposition 2** *The choice of policy by a trustworthy government depends on  $\gamma, \theta$  and  $\varphi$  as follows:*

1. If  $W(\varphi, \hat{\rho}(\underline{\pi}, \varphi) : 1) \geq 0$ , then  $\lambda = \theta$  for all  $\gamma \in [0, 1]$ .
2. If  $W(\varphi, \hat{\rho}(\underline{\pi}, \varphi) : 1) < 0$ , then there is a critical value  $\hat{\gamma} \in (0, 1]$  such that  $\lambda = \theta$

$$\lambda = \begin{cases} \theta & \text{for } \gamma \geq \hat{\gamma} \\ 0 & \text{otherwise.} \end{cases}$$

Case 1 means that if citizens do not trust their government but there is sufficient coercive power, the policy can still be worthwhile as there will be enough compliance relative to the benefits of the policy. Case 2 has the interesting implication where trust matters for whether the policy goes ahead. In a low trust environment, the policy is not worthwhile as there is low compliance. But when there is trust in

government the policy goes ahead when  $\theta = 1$ . This is relevant when the government has relatively little formal enforcement power but trust is a substitute for this. As we discuss below, this leads us to predict that in high trust countries there will be tendency to introduce policies even when coercive power is low.

The model emphasizes that there can be ‘type I’ and ‘type II’ policy errors. The existence of untrustworthy politicians implies that we can have  $\lambda \neq \theta$  for either  $\theta \in \{0, 1\}$ . But it may also distort the decisions of good governments not to set  $\lambda = 1$  when  $\theta = 1$  because the government anticipates low compliance.

To focus the analysis from now onwards, we strengthen (7) to assume that  $W(0, \hat{\rho}(\pi, 0) : 1) > 0$ , i.e. that the policy goes ahead whenever  $\theta = 1$  even if  $\varphi = 0$  for all  $\gamma \geq 0$ .<sup>4</sup> Therefore, the only margin of distortion induced by low trust is low compliance, rather than low trust also having a policy distortion for trustworthy governments.

**Trust and welfare** Ex-ante welfare, i.e. before  $\theta$  is revealed, is

$$\begin{aligned} \hat{W}(\varphi, \gamma) = & \pi [\gamma + (1 - \gamma)\beta] W(\varphi, \hat{\rho}(\hat{\Pi}^1(\gamma), \varphi) : 1) \\ & + (1 - \gamma)(1 - \pi)\beta W(\varphi, \hat{\rho}(\hat{\Pi}^1(\gamma), \varphi) : 0) \end{aligned} \quad (11)$$

where the second term is the policy distortion due to an untrustworthy government sometimes introducing a policy that is not worthwhile. We now show that increasing trust increases citizens’ welfare based on (11). Specifically,

**Proposition 3** *Ex-ante welfare is increasing in trust in government, i.e.  $\hat{W}(\varphi, \gamma)$  is increasing in  $\gamma$ .*

Thus, there is a welfare loss from low trust due to the impact on compliance. The first effect of higher  $\gamma$  is that one is less likely to get an untrustworthy government who does choose  $\lambda = \theta$ . This is the *policy distortion* from low trust. The second effect is due to the fact that, given that higher  $\gamma$  induces higher compliance, greater trust means greater compliance. Hence, high trust reduces the *compliance distortion* from low trust.

### 3.3 Investing in coercive compliance

We now allow the coercive power of government to be endogenous. We do so in a simple way by supposing that the citizens do so collectively behind a veil of ignorance, prior to knowing the specific policy challenges that they will face. At this point, there will be unanimity about the optimal level of compliance so this seems like a sensible approach. We think of this like an investment in legal capacity in the sense of Besley and Persson (2009, 2011). At the stage where policy is made, there is delegated policy-making with asymmetric information as in the model so far.<sup>5</sup>

Formally, we allow for a choice of  $\varphi$ , funded via a lump-sum tax on all citizens at a cost of  $c\varphi$ , which is chosen to maximize ex ante welfare, i.e. before the citizens know what kind of government will be in place. The timing of the model is now modified to the following:

1. Citizens assemble and determine  $\varphi$  to maximize expected welfare.
2. Nature determines  $\theta \in \{0, 1\}$ ,  $r \in [-R, R]$  and  $\tau \in \{t, u\}$ . Citizens have prior belief  $\pi$  that  $\theta = 1$ .
3. The government chooses  $\lambda$ .

<sup>4</sup> This requires that  $\hat{\Delta}(\pi) > 0$  which will hold if  $\pi$  is large enough.

<sup>5</sup> An interesting future extension would be to a dynamic model where incumbents make long term investments in compliance.

4. For  $\lambda \in \{0, 1\}$ , citizens update their belief that  $\theta = 1$  to  $\Pi^\lambda(\gamma)$  using Bayes' rule and then choose whether to comply with the policy.
5. Payoffs are realized.

The optimal level of coercion now solves

$$\hat{\varphi}(\gamma) \in \arg \max \{ \hat{W}(\varphi, \gamma) - c\varphi \}. \quad (12)$$

This is characterized in:

**Proposition 4** *The optimal level of coercion is at a corner solution, i.e.  $\hat{\varphi}(\gamma) \in \{0, E - \hat{\Delta}(\hat{\Pi}^1(\gamma))\}$ , and if  $\hat{\varphi}(\gamma) > 0$ , then the level of coercion is decreasing in trust. Either voluntary compliance is optimal for all  $\gamma \in [0, 1]$  or there exists  $\tilde{\gamma} \in (0, 1)$  such that voluntary compliance is optimal for all  $\gamma \geq \tilde{\gamma}$ .*

This says that the welfare-maximizing level of coercion is either to full enforcement or purely voluntary compliance. The proof of Proposition 4 (see Appendix) shows that welfare is a convex function of coercion which implies a boundary solution. The voluntary compliance solution is chosen in high trust situations. However, trust does also reduce the cost of coercive compliance since when positive,  $\hat{\varphi}(\gamma)$  is decreasing in  $\gamma$ . This is because, conditional on observing  $\lambda = 1$ , citizens in high trust environments are likely to believe that this policy has been introduced because it is in the public interest to do so.

This finding is interesting as we do indeed see many policies introduced with little effort by government to enforce them. As we discuss below, this was particularly true of a number of measures that were introduced during the pandemic. These policies can make sense when the government's announcement of the policy measure is thought to be consistent with maximizing welfare, thus compliance can be achieved more efficiently through trust rather than costly coercion.

## 4 The origins of trust

We now link the model and its framework to some of the ideas, discussed above, on the origins of trust in government. We start by linking it to debates about whether political institutions work to serve the public interest. We then link the model back to some of the literature on cultural determinants of political trust.

### 4.1 Institutions

So far we have stressed that trust is created by increasing  $\gamma$ , i.e. the likelihood that a policy-maker is trustworthy. But we have treated this as a parameter rather than an equilibrium outcome. We have also taken it as a fact of life that  $\beta < 1$ , i.e. untrustworthy politicians will not set  $\lambda = \theta$  all of the time. These capture the two main aspects of trust stressed by James Madison in the federalist papers when he says that:

(t)he aim of every political Constitution, is or ought to be, first to obtain for rulers men who possess most wisdom to discern, and most virtue to pursue, the common good of society; and in the next place, to take the most effectual precautions for keeping them virtuous whilst they continue to hold their public trust. – James Madison (*The Federalist Papers*, LVII)<sup>6</sup>

This quote also implicitly frames the challenge of building trust in terms of constitution design. However, as we have come to learn in the two centuries since Madison wrote these words, there are many

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<sup>6</sup> Madison (1961).

organizational features of policy-making, such as the role of the media, lobbying and the structure of political parties, which are not part of the narrowly written constitutional rules but are part of the fabric of the body politic. More recently, there has also been a stress on the role of culture in creating norms and values that support pro-social behaviour which are also the bedrock of effective public service.

But Madison's framing does stress two key dimensions which parallel  $\gamma$  and  $\beta$  in the model; the first part of this quote refers to selection and the second to the problem of incentives. Both of these are affected by institutions, organizations, norms and values. We now briefly discuss how this happens.

**Selection** In the model above, we assumed that there were different types of policy-makers that were fixed at the point they were asked to make policy decisions. Thus, trustworthiness is a type and the way to increase trust, i.e. increases  $\gamma$ , is to increase the fraction of trustworthy policy-makers. Moreover, we characterized an increase in trust in terms of the perceived proportions of those who make policy decisions. In a fully specified model,  $\gamma$  is an *equilibrium outcome* rather than an exogenously given parameter. Enhancing trust in a selection model comes from improving equilibrium selection and trying to ensure that a better class of politicians is chosen to serve.<sup>7</sup>

The raw material on which selection depends is the characteristics of the citizens of a polity. In ancient Greece, selection to public office was by lot and hence there was a more or less immediate link between the trustworthiness of citizens and government. But as societies have experimented through history, so they have found ways of refining selection processes. However, as this has happened, there has been less dependence on a 'jury service' style model and one where studying selection requires looking at the incentive to seek public office, either as bureaucrats or politicians. The talent and motivations of those who put themselves forward for public office is thus key. The exact determinants of the quality of the political class depend on many things including the rewards to holding office and the extent to which there is public service motivation in the population. How far the quality of candidates can be perceived during selection processes is far from clear. In the case of politicians, it reflects the conduct of political campaigns and the extent to which media scrutiny affects what is learned about candidates in the political process. To the extent that information is imperfect, politics is subject to a potential adverse selection problem, especially when the spoils to public office are high, whether this be in the form of rewards while in office or after leaving office.

Even if the potential set of policy-makers contains a fraction of known trustworthy and untrustworthy ones, there is still an issue of having the right framework for ensuring that only the trustworthy are picked. This requires overcoming coordination problems, especially in a world of ideological polarization since voters may fear that voting for their preferred candidate on competence grounds could simply favour a candidate of another ideology to succeed. Similarly, untrustworthy policy-makers may have a selection advantage if they are willing to offer bribes and inducements selectively to those who support them. In practice, there is also a role for party organizations with a potential for a trade-off between loyalty and competence when senior political leaders are deciding which potential candidates to support.

It should be clear from this discussion that the structure of background institutions and organizations could matter a lot to whether the government can be trusted. Thus, trust as selection is the product of a complex set of interactions, all of which can potentially be reformed. From time to time, there are explicit efforts to change the composition of the political class such as India's policy of political reservations for women and scheduled castes/tribes. There is ample evidence that this both shifted

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<sup>7</sup> There are now many models of this, for example Acemoglu et al. (2010) and Caselli and Morelli (2004). Besley (2005) gives an overview of political selection issues.

policy-making and the perception of those selected for public office.<sup>8</sup> This could affect  $\gamma$  in the model if there is greater trust in those who are elected to office.

**Incentives** Above, we focused on changes in  $\gamma$  to represent trust. However, even the untrustworthy may be induced to do what citizens would like them to do if there are well-designed incentives for them to do so. Incentives come in many forms including formal contractual monetary incentives. However, these are rare in the case of policy-making, in part because of the difficulty of contracting on the relevant outcomes. So in our framework, this would be the case if it were hard to write down formally measurable conditions that indicate the value of  $\theta$ . However, so-called ‘soft information’ based on subjective criteria could be important and, if those who can observe  $\theta$  have some power to sanction policy-makers, this can create a system of incentives.<sup>9</sup>

The most obvious case to consider is the reappointment of politicians or bureaucrats as a means of creating implicit incentives. In such cases, institutional frameworks matter as they determine the rules of the game for reappointment. Therefore, they determine the timing of evaluation processes and who has the power to appoint (often referred to as the selectorate). This could be a system of mass accountability as with an election or a more closed system where ‘experts’ assess the performance of those who make policy decisions. This is the case, for example, with the reappointment decisions of senior bureaucrats and judges. Institutions may also be important in determining how likely it is that  $\theta$  will be revealed (even subjectively). Following the recent pandemic, a number of countries have commissioned enquiries to try to determine what actions were needed from an ex-post perspective. But for many aspects of the pandemic, we will likely never know whether the timing and severity of the lockdowns that were put in place were justified. Our modelling approach will therefore allow for the ex-post revelation of information to be probabilistic.

To illustrate the power of incentives and how they can be thought of as the basis of trust, we will assume that  $\gamma = 0$ , i.e. there are no politicians who are motivated to maximize the welfare of citizens. So if this happens, it is because they are willing to set aside self-interest to do so. The framework that we developed above for thinking about the behaviour of untrustworthy politicians can easily be given some microfoundations rather than assuming that  $\Omega$  is just a form of exogenous ‘warm glow’ utility. We could assume instead that there is a reappointment process following the choice of policy and that the reward from choosing  $\lambda = \theta$  is  $\Omega = \phi V$ , where  $\phi$  is the probability that  $\theta$  becomes known and  $V$  is the value of holding a public office, i.e. being reappointed. Societies could decide how attractive holding public office is through wage payments and other office holding ‘rent’. Now,  $\beta = G(\phi V)$ .

This approach suggests two ways of sharpening incentives: either make being reappointed more attractive or increase the detection probability by having a better process of ex-post policy evaluation. Hence,  $\phi$  or  $V$  could be increased. Then there would be a higher probability that  $\lambda = \theta$  for both  $\theta = 1$  and  $\theta = 0$ .

In the case where  $\gamma = 0$ , the conditional probability that  $\theta = 1$  if  $\lambda = 1$ , following (9) is

$$\hat{\Pi}^1(0) = \frac{\pi G(\phi V)}{\pi G(\phi V) + (1 - \pi)(1 - G(\phi V))}. \quad (13)$$

Now, the level of compliance by citizens would depend on institution design via the dependence of  $\hat{\Pi}^1(0)$  on  $\phi$  and  $V$ . Moreover, it is straightforward to check that this is increasing in  $\phi V$ , i.e. sharpening appointment incentives increases trust in a way that parallels an increase in  $\gamma$  in the core model. This

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<sup>8</sup> See, for example, Beaman et al. (2009).

<sup>9</sup> Besley (2006) reviews the literature and looks at the role of institutions like the media in strengthening accountability and the alignment of policies with citizens’ preferences.

will lead also to great compliance when  $\lambda = 1$ . Thus, trust and compliance can be increased also by improving incentives for policy-makers.<sup>10</sup>

## 4.2 Perceptions and learning

The static model developed so far has much less to say directly about theories of political trust based on cultural dynamics as reflected in attitudinal data. However, it is useful to connect some of these ideas to the framework, not least given the empirical exercise below. We will also motivate why it is that  $\gamma$  could be heterogeneous across individuals.

Whether trust is rooted in selection or incentives, citizens will have their perceptions of trust shaped by their experience of government, not just of government behaviour, but also in every day life. Social encounters with peers, parental influence and past policy responses to events can shape how individuals perceive the trustworthiness of government. The kinds of experiences that do this are highly variable. Some generations are exposed to significant national events such as wars and pandemics which are a test of government effectiveness and can leave a lasting impression. Idiosyncratic experiences are also created by encounters with the state in different dimensions.

In our model, there could be a dynamic evolution of trust depending on the extent to which  $\theta$  becomes revealed over time. Having observed and complied with  $\lambda = 1$ , if citizens could observe  $\theta$ , then they would be able to assess whether the government was trustworthy or not. The general approach to this would allow individuals to have a prior  $\gamma$ , then receive signals about  $\theta$  ex-post. These would lead to updating about  $\gamma$  over time. In standard updating models, this would lead to a gradual evolution of  $\gamma$  depending on each individual's information set, and would generate heterogeneity in  $\gamma$  across individuals that we see in the data. It would mean that some policy-making events, as we have seen in the pandemic, would be particularly salient in people's lives if it was subsequently revealed that the government had chosen  $\lambda = 1$  when it became apparent that  $\theta = 0$ .

This lifetime learning model with continuous updating is often contrasted with an approach based on the idea that most learning occurs among individuals in their formative years and thereafter there is less malleability in attitudes. This kind of approach is documented, for example, by Giuliano and Spilimbergo (2014) who use the US General Social Survey to show that redistributive preferences are correlated with experiences of growing up in difficult economic times in impressionable years (which they define as being aged 18–25). They also find a link between political trust (in the US Congress) and such experiences. This is an interesting variant on learning models that would underpin the possibility of strong cohort effects in  $\gamma$ -differences in survey data. It could underpin the observation that those who are brought up in communist regimes are less trusting of government compared to those who were brought up after the fall of communism.

A learning model also underpins the strong country-level component as individuals share common influences and experiences. This view is also consistent with strong inter-generational persistence within countries as people acquire their trust perceptions from their parents and teachers. This is still an evolving area of research and leaves much open for empirical investigations of what drives trust in government.

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<sup>10</sup> It should also be noted that even without setting  $\gamma = 0$ ,  $\hat{\Pi}^1(\gamma)$  is increasing in  $\phi V$ , i.e. improving incentives will increase trust in the sense of believing that  $\lambda = 1$  only if  $\theta = 1$ .

## 5 Trust and state capacity

We now draw out the model's insights for how trust links to increases in state capacity. As we discussed in the introduction, increasing state capacity is about making the state more effective in intervening in the economy. There are two ways to think about this which can be captured in the model. First, trust in government can reduce the cost of implementing a policy via reducing compliance costs. Second, some policies become feasible in high trust environments that would not be feasible when trust is low. We now bring these out using the model.

### 5.1 Reducing compliance costs

To illustrate how trust reduces compliance costs, first consider the case in Proposition 4 where the government relies on coercion. The optimal level in this case is  $\hat{\varphi}(\gamma) = E - \hat{\Delta}(\Pi^1(\hat{\gamma}))$  and we observed that this guaranteed full compliance, i.e.  $\hat{\rho}(\hat{\Pi}^1(\gamma), \varphi) = 1$ . The compliance cost is  $c[E - \hat{\Delta}(\Pi^1(\hat{\gamma}))]$ . This can be thought of as the standard way of thinking about state capacity as in the work of Besley and Persson (2009, 2011).

Increasing trust expands state capacity in this case by lowering the cost of compliance. This is because  $\hat{\Pi}^1(\gamma)$  is increasing in  $\gamma$ ; citizens increase their belief that the policy is warranted when they observe that it has been implemented. This therefore lowers the compliance cost.

Although the model illustrates this idea in a very specific way, it is reasonable to think that this kind of argument has wide applicability. Many policies, whether in the form of taxation or regulation, work only if citizens are willing to comply with them. But there are limited state resources for enforcement. If the citizens are convinced that a policy is worthwhile, then they are willing to comply voluntarily to the extent that there are pro-social motivations of the kind that we are studying. Of course, the extent to which this is true will vary across the type of policy. But the government can focus its limited enforcement capability precisely in areas where there is little pro-social compliance and away from those areas where trust builds compliance. This will mean that less resources are needed to be spent on compliance and more of the public budget can be spent on valuable forms of public spending.

### 5.2 Expanding feasible policies

The argument that state capacity increases by expanding the set of feasible policies can be thought of as follows. Recall that we suppose that there is a cost of introducing the policy, denoted by  $C$ . Thus, the benefit of introducing the policy intervention has to be compared to this. The net benefit will be positive when setting  $\lambda = 1$  is worthwhile if  $\theta = 1$ . And this will be the case when

$$\max \{W(0, \hat{\rho}(\hat{\Pi}^1(\gamma), 0) : 1), W(E - \hat{\Pi}^1(\gamma), 1 : 1)\} > C. \quad (14)$$

The left-hand side is the the maximum of going ahead with the policy either with voluntary compliance or coercive compliance.

The key observation is that the left-hand side of (14) is increasing in  $\gamma$ . Thus, we could have a situation where (14) does not hold when  $\gamma$  is low and holds when  $\gamma$  is sufficiently high. This is because, if trust is low, then  $\hat{\Delta}(\hat{\Pi}^1(\gamma)) < 0$ , and the only way to make policy feasible is through coercive compliance which is costly. One of the reasons why trust enhances policy feasibility is the lower compliance costs that we discussed in the previous section. But there are two additional reasons.

First, when there is voluntary compliance, the policy becomes feasible if government is sufficiently trusted. Moreover, as  $\gamma \rightarrow 1$ , the policy is feasible if



$$\frac{\Delta^2}{2E} > C. \quad (15)$$

In this case, this is because increasing  $\gamma$  increases compliance even if compliance is voluntary.

Second, the analysis in Proposition 2 shows that, whether compliance is voluntary or coerced, higher trust can make a policy feasible that would otherwise be infeasible with low trust. In effect, increasing the probability that  $\lambda = 1$  when  $\theta = 1$ , means that trust increases the alignment of policy-maker and citizen preferences.

As with lower compliance costs as a driver of state capacity, there are also good reasons to think that the argument is more general than the specific argument spelled out here. In a world where there are many dimensions of intervention, governments in high trust environments may have a large range of interventions that are feasible. For example, some forms of taxation or certain kinds of regulations may only be feasible where high trust makes them worthwhile. A good example was the recent experience in the COVID-19 pandemic where governments were looking at a range of non-pharmaceutical interventions such as lockdowns, mask wearing policies, vaccination strategies and regulations around social distancing. Which interventions were feasible depended on whether the benefits exceeded the cost once compliance was factored in. Our analysis suggests that a narrower range of policies could be chosen in low trust environments. As the state expands the range of capacities to fight climate change, a similar set of factors are likely to come to the fore.

### 5.3 Discussion

Tying the discussion of this section with that of the origins of trust above, the model provides a link between institutions and state-capacity building via the trust connection. Indeed, the message is essentially the same as in the strategic investment models of Besley and Persson (2009, 2011) where the focus is on how cohesive institutions drive state capacity investment. Trust, as modeled here, is a source of cohesion ensuring that citizens and government have a common understanding of the policy challenge. And if institutions that improve incentives and selection facilitate this, then this enhances state capacity.

However, the framework also opens the door to the possibility of cultural factors that enhance trust to play a role that can have a longer historical impact even if there is institutional reform. So a society where historical experiences of citizens lead them to be less trusting of government will find it harder to build state capacity. A concrete illustration of this is the mistrust of government in the former communist countries of Eastern Europe where there appears to be a lasting legacy of mistrust. Even if institutions are built to try to enhance trust, there could still be headwinds in building state capacities in such places.

## 6 Empirical implications

In this section, we look at empirical evidence for two key model predictions. The first is the link between trust and compliance, where we explore cross-country patterns based on the World Values Survey and the European Values Survey. We also provide within-country evidence using both these international surveys as well as UK panel data collected during the COVID-19 pandemic focused on willingness to comply with various public health measures. We then turn to empirical evidence on an implication of the model which suggests that policies that rely on voluntary compliance are more likely when trust is high.

## 6.1 Trust and compliance

### 6.1.1 Cross-country patterns

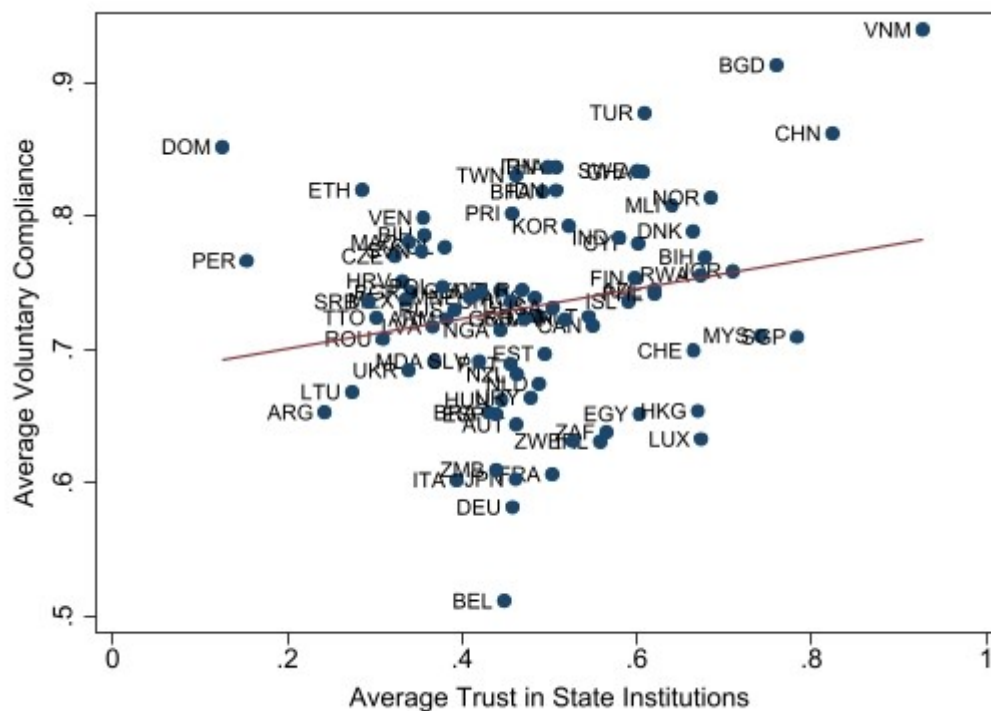
Proposition 1 gave the theoretical underpinnings for a link between trust and aggregate compliance when there is a willingness to comply with policies which citizens perceive to be justified, turning compliance into a pro-social action.

To investigate whether compliance is increasing in trust in government, we use the World Values Surveys (WVS) and European Values Survey (EVS) that have consistent questions on political views and reported compliance for more than 100 countries. Specifically, we use 6 waves of the WVS and 5 waves of the EVS, together known as the Integrated Values Survey (IVS). This gives us data on trust in government institutions, and attitudes towards voluntary compliance. It shows strong evidence of a link between trust and compliance.

To explore this, we use the question in the data on whether respondents have ‘a great deal’ or ‘quite a lot’ of confidence in the following: government, the justice system/courts, parliament, the police and the civil service. To create an overall index of trust in state institutions, we simply average across the answers to these questions. For summary attitudes towards voluntary compliance, we use three key variables: willingness to pay higher taxes to protect the environment, willingness to fight for the nation if called on and whether it is justifiable to cheat on taxes. Again, we take an average across the three answers.

Figure 1 shows that there is a positive cross relationship between these two summary measures of trust and compliance, i.e. countries where there is greater trust seem also to have higher levels of compliance. This is consistent with the core prediction of the model as expressed in Proposition 1. But, of course, this is purely illustrative and we cannot interpret this correlation causally given the scope for a range of omitted variables to be driving the relationship.

Figure 1: A positive cross-country relationship between two measures of trust and compliance



Source: authors' calculation based on Integrated Values Survey (IVS).

We now therefore look at the evidence for individual respondents where we can control for country differences with fixed effects.

### 6.1.2 Within-country evidence

To unpack the correlations in Figure 1, we will now study individual views on compliance. We will add evidence from a cohort survey during the COVID-19 pandemic in Section 6.1.3, and evidence from the Integrated Values Survey in Section 6.1.4.

**Empirical approach** We know from the data that individuals have different degrees of confidence in the government. We model this empirically by supposing that there is heterogeneity in levels of trust in government, i.e.  $\gamma_{ik} \in \{\gamma_L, \gamma_H\}$  where  $\gamma_H > \gamma_L$  and let  $\zeta_c$  be the fraction of high trust citizens in the population. Let  $\delta_{ikj} \in \{0, 1\}$  denote whether each citizen  $i$  in country  $k$  complies with policy  $j$ . We will think of enforcement varying at the country level, denoted by  $\varphi_k$ . And different policies are associated with different values of  $\Delta_{jk}^\sigma$  where  $\sigma$  is also state specific, i.e. whether the policy is valuable in country  $k$ . Our model predicts that the key variable denoting compliance is the belief about the need for the policy  $\Pi_k^\lambda(\gamma_{ik})$  which can depend on different country-level political outcomes such as  $\beta_k^\sigma$  and  $\pi_k$ , which can also be country specific. Then

$$\delta_{ik} = 1 \text{ if and only if } \hat{\Delta}^k(\Pi_k^\lambda(\gamma_{ik})) + \varphi_k - \varepsilon_{ik} \geq 0. \quad (16)$$

Our model predicts that there is a positive link between  $(\gamma_{ik}, \varphi_k)$  and compliance. Let  $t$  denote different time periods at which compliance decisions are made, and representing compliance using a linear probability model yields

$$\delta_{ikt} = \alpha_k + \alpha_t + \alpha_x x_{ik} + \eta_{ikt} \quad (17)$$

where  $\alpha_k$  are country dummies,  $\alpha_t$  are time dummies and  $x_{ik}$  is a vector of relevant background characteristics of the sample such as age, education and gender. The framework can explain why having greater trust in government increases compliance through the term  $\hat{\Delta}^k(\Pi_k^\lambda(\gamma_{ik}))$  which we have ‘linearized’ in (17). We are supposing that differences in enforcement regimes are absorbed in the country fixed effects as we assume that these mainly vary across countries.<sup>11</sup>

We use data from two sources: (i) the UK COVID-19 longitudinal survey based on five cohorts and two waves (May 2020 and March 2021); and (ii) the Integrated Values Survey (WVS + EVS) where we have results from 11 different survey waves (1981–2020) even though the coverage and availability of questions varies quite a bit.

### 6.1.3 COVID-19 compliance: evidence from the UK Cohort Studies

This section presents survey evidence on trust in government and reported compliance with COVID-19 measures. We rely on a large UK panel survey conducted in 2020–21 on four national longitudinal cohort studies (the Millennium Cohort Study for both cohort members and their parents, Next Steps Study, 1970 British Cohort Study and 1958 National Child Development Study). We use data from Wave 1 (conducted in May 2020), and Wave 3 (conducted between February and March 2021).<sup>12</sup> Here the left-hand side variable,  $y_{irt}$ , includes different measures of compliance for respondent  $i$  in region  $r$  at date  $t$ .

Our measure of compliance comes from a question where each respondent is asked to rate their compliance with social distancing and with COVID-19 guidelines on a scale from 0 (not at all compliant)

<sup>11</sup> Enforcement could also vary across individuals and would then be picked with some of the individual controls.

<sup>12</sup> We do not use Wave 2 of the survey as there is no question on compliance with social distancing, guidelines, vaccines, or the use of the NHS app.

to 10 (fully compliant). From this, we create a dummy variable equal to one if they report full compliance.<sup>13</sup> We also use a variable where respondents are asked whether they would choose to be vaccinated if offered and whether they have downloaded the NHS Test and Trace app.

Our core empirical specification is

$$y_{irt} = a_r + a_t + b\text{TrustGov}_{irt} + cx_{it} + \varepsilon_{irt}. \quad (18)$$

Trust in government ( $\text{TrustGov}_{irt}$ ) comes from a self-assessment of how trusting of government respondents reported to be from 0 (Not at all) to 10 (Extremely). We categorize a survey respondent as having trust in government if he or she responded with a score of 5 or above. The controls,  $x_{it}$ , include demographics (gender, immigrant status, year of birth, household size), ten employment status categories to proxy for economic standing, and several measures of health status such as a general subjective mental and physical health self-assessment before the pandemic,<sup>14</sup> and whether an individual was recommended to shield. We also control for COVID-19 status such as whether an individual had had COVID-19, whether they had been hospitalized and whether they had tested for COVID-19. We also include survey wave and region fixed effects,  $\{\alpha_r, \alpha_t\}$ . For compliance with social distancing, which was asked in two waves (Waves 1 and 3), we also have a specification which includes an individual fixed effect. Standard errors are clustered at the level of the individual.

The results are presented in Table 1. Columns (1) and (2) focus on compliance with social distancing measures and find evidence of a strong positive relationship between social distancing and trust in government. This is true even in Column (2) where an individual fixed effect is included. In Column (3), we look at compliance with COVID-19 guidelines and find a similar positive relationship. Column (4) finds that willingness to be vaccinated is also positively correlated with trust and in Column (5), this is also positively related to downloading the NHS Test and Trace app, a more direct form of compliance. We also find a consistent magnitude for the coefficient for trust across specifications, between 2 and 7 per cent.

Taken together, these results are suggestive of a strong association between trust in government and willingness to comply with COVID 19 guidance in a way that is consistent with the core mechanism of the model.

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<sup>13</sup> The questions asked are: ‘How much complying do you do with social distancing guidelines?’; ‘How much have you complied with Government guidelines to reduce the spread of COVID-19?’. Answers are on a scale of 0–10, where not complying is 0 and fully complying is 10. We create a dummy variable for full compliance given that the modal answer is 10 on both questions.

<sup>14</sup> Mental health and General health self-assessment are measured on a scale with 5 categories: excellent, very good, good, fair, poor.

Table 1: Trust and compliance to COVID-19 guidelines in the UK

	(1)	(2)	(3)	(4)	(5)
	Compliance with social distancing	Compliance with social distancing	Compliance with guidelines	Take vaccine if offered	Downloaded NHS COVID-19 app
Trust in government	0.0201*** (0.00542)	0.0360*** (0.0102)	0.0349*** (0.00627)	0.0279** (0.0112)	0.0653*** (0.00648)
Observations	38,637	24,594	24,578	5,691	23,299
Individuals	26,340	12,297	24,578	5,691	23,299
$R^2$	0.062	0.69	0.087	0.053	0.048
Average compliance	0.52	0.53	0.53	0.77	0.58
Average trust	0.57	0.60	0.51	0.54	0.50
Individual FE		X			
Wave FE	X	X	X	X	X
Region FE	X	X	X	X	X
Demographics FE	X		X	X	X
Economics FE	X		X	X	X
Health FE	X		X	X	X
Covid-19 health status	X		X	X	X

Note: standard errors are clustered at the individual level. Region fixed effects (FE) include dummies for 12 regions of residence. Demographics FE are: gender, emigrant status, year of birth, and household size. Economics FE are dummies for 10 categories of employment. Health FE are answers to general health self-assessment pre-pandemic, mental health self-assessment, whether respondent received a shield letter (at-risk of COVID-19), and COVID-19 health status are dummies for having had COVID-19, having been hospitalized, and never testing for COVID-19. Individual fixed effects are included in Column (2) only as compliance with social distancing is the only question related to compliance asked in both Waves 1 and 3. Source: the data come from a UK panel survey conducted in 2020–21 from four national longitudinal cohort studies (the Millennium Cohort Study for both cohort members and their parents, Next Steps study, 1970 British Cohort Study and 1958 National Child Development Study). Observations are taken from Waves 1 and 3 (conducted in May 2020, and between February and March 2021, respectively).

#### 6.1.4 Evidence from the Integrated Values Survey

We now look at evidence based on data from the Integrated Values Survey (IVS).<sup>15</sup> The outcome variables  $y_{ict}$  for individual  $i$  in country  $c$  in wave  $t$  are: willingness of individuals to fight for their country,<sup>16</sup> whether it is justifiable to cheat on taxes and willingness to increase taxation to protect the environment. All are measured on a 4-point scale and we order them so that a higher score is always greater willingness to comply. In all cases the left-hand side variable is coded as a dummy variable that is equal to one if the compliance measure answer is equal to four. In the raw data, about 71 per cent say they are willing to fight for their country, only around 9 per cent say that it is justifiable to cheat on their taxes and 46 per cent say that they would be willing to pay higher taxes to protect the environment.

Our core empirical specification is:

$$y_{ict} = a_c + a_t + b\text{TrustGov}_{ict} + cx_{ict} + \varepsilon_{ict} \quad (19)$$

where  $\{a_c, a_t\}$  are country and survey wave fixed effects. Trust in government ( $\text{TrustGov}_{ict}$ ) is measured by an individual's subjectively reported confidence in government based on a question where the respondent is asked 'I am going to name a number of organizations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all?'. We use the answers as applied to the government in the capital city and code the answer as equal to one if the answer is 'a great deal of confidence' or 'quite a lot of

<sup>15</sup> We use six waves (Waves 2–7) of the World Values Survey (WVS) and five waves of the European Values Survey (EVS).

<sup>16</sup> The question is framed in the following way: 'Of course, we all hope that there will not be another war, but if it were to come to that, would you be willing to fight for your country?' and respondents can answer 'Yes' or 'No'.

confidence', i.e. if there is high confidence. The controls,  $x_{ict}$ , in (19) include: demographics such as age, gender, married, religion; economic variables such as education, employment, dummy variables for 17 different job types and ten income bands; geographical variables such as World Bank region and income group, as well as five dummy variables for size of town. All standard errors are clustered at a country level.

The core results are in Table 2. In Column (1), we use willingness to fight for one's country and note that those with higher confidence are 6 per cent more likely to say that they would be willing to fight. As shown in Column (2), when it comes to willingness to cheat on taxes, having confidence in government yields just short of a 2 per cent reduction. In Column (3), we take the first principal component for these two compliance questions and find that there is still a significant positive coefficient on willingness to comply. And for Column (4), we look at the willingness to pay higher taxes to support the environment and find that being confident in government is associated with a 7 per cent increase in willingness to comply.

Table 2: Trust and compliance in the International Value Survey

	(1)	(2)	(3)	(4)
	Willing to fight for country	Justifiable to cheat on taxes	Compliance index	Increase taxes if used to prevent pollution
Confidence in government	0.0621*** (0.00493)	-0.0182*** (0.00291)	0.130*** (0.0146)	0.0697*** (0.00532)
Observations	361,960	462,635	361,960	164,389
Countries	106	112	106	75
Sample period	1990–2020	1990–2020	1990–2020	1990–2009
$R^2$	0.14	0.056	0.16	0.074
Mean dep. var.	0.71	0.094	0.013	0.61
Average confidence	0.46	0.44	0.46	0.46
Study Design FE	X	X	X	X
Country FE	X	X	X	X
Geographic FE	X	X	X	X
Demographic FE	X	X	X	X
Economic FE	X	X	X	X
Year FE	X	X	X	X

Note: standard errors clustered at the country level. Compliance index is based on the principal component analysis of two variables: justifiable to cheat on taxes, and willingness to fight for country. Study design FE are: survey wave and survey type dummies. Geographic FE : regions, income groups, and town size dummy variables. Demographic FE : age, gender, married status, and religion dummies. Economic FE : education, employment, job type, income bands dummies.

Source: authors' elaboration based on the International Value Survey, which is a harmonized version of the World Value Survey and the European Value Survey.

Although these results are interesting, there is the usual concern that there are factors that are correlated with confidence in government and willingness to comply that are not being measured. We now propose an instrumental variables (IV) approach which addresses this by using the idea that there are cohort-level differences in trust depending on the environment into which people are socialized. In particular, a set of 'emancipative values' related to freedom of choice, individual autonomy and gender equality, have been linked to a critical view of authority (Welzel and Inglehart 2010). We use a common measure of emancipative values from the World Values Survey, and take the average of the cohort emancipative

values by country based on seven cohorts<sup>17</sup> as an instrument. Emancipative values are derived from a range of variables suggested in Welzel (2013). The idea is to capture an increased appreciation of human freedoms across cohorts based on a range of survey questions that express views about autonomy, equality, choice and voice that are directly affecting trust in governments.<sup>18</sup>

The first-stage regression that we use is

$$\text{TrustGov}_{ict} = \alpha_c + \alpha_t + \beta \text{EmVal}_{ict} + \gamma x_{ict} + \eta_{ict} \quad (20)$$

where for  $\text{EmVal}_{ict}$ , we use the average value of emancipative values in the cohort into which an individual is born. We hypothesize that emancipative values at the country  $\times$  cohort level are directly affecting trust in government (Welzel and Inglehart 2010), but not compliance conditional on control variables.

Table 3: Trust and compliance in the International Value Survey, IV results

	(1)	(2)	(3)	(4)
	<i>First stage:</i> Confidence in government	Justifiable to cheat on taxes	Willing to fight for country	Compliance index
Cohort emancipative value	-0.384*** (0.0888)			
Confidence in government		-0.404*** (0.143)	0.681* (0.360)	2.560*** (0.838)
Observations	463,438	439,738	351,825	351,825
Countries	105	104	102	102
Sample period	1990 - 2020	1990 - 2020	1990 - 2020	1990 - 2020
Average confidence	0.45	0.45	0.46	0.46
F-statistics	18.7			
Kleibergen-Paap rk Wald F statistic		17.6	17.3	17.3
Cragg-Donald Wald F statistic		147.4	137.2	137.2
Town size FE	X	X	X	X
Demographic FE	X	X	X	X
Economic FE	X	X	X	X
Year FE	X	X	X	X
Country FE	X	X	X	X

Note: standard errors clustered at the country level. The first column represents the first stage of the IV results, where cohort emancipative value is the country  $\times$  cohort average of Welzel's (2014) derived emancipative value, a measure of the degree of freedom of choice. We average this individual metric at the country  $\times$  cohort level, using 7 different cohorts (pre-1928; 1928–45; 1946–64; 1965–80; 1981–96; 1997–2012; post-2012). Compliance index is based on the principal component analysis of two variables: justifiable to cheat on taxes, and willingness to fight for country. Study design FE are: survey wave and survey type dummies. Geographic FE : regions, income groups, and town size dummy variables. Demographic FE : age, gender, married status, and religion dummies. Economic FE : education, employment, job type, income bands dummies.

Source: authors' elaboration based on the International Value Survey, which is a harmonized version of the World Value Survey and the European Value Survey.

<sup>17</sup> We use as cohort those born before 1928, between 1928 and 1945, between 1946 and 1964, between 1965 and 1980, between 1981 and 1996, between 1997 and 2012, and after 2012.

<sup>18</sup> The sub-indexes are: 1. Autonomy: a. Independence as kid quality (A029); b. Imagination as kid quality (A034); c. Obedience not kid quality (A042). 2. Equality: a. Gender equality: in jobs (C001), politics (D059), and education (D060). 3. Choice: a. Acceptance of homosexuality (F118); b. Acceptance of abortion (F120); c. Acceptance of divorce (F121). 4. Voice based on two variables: a. the respondent's two most important goals include giving people more say in important government decisions, and protecting freedom of speech; b. the respondent's two most important goals for country include seeing that people have more say at their workplace and their communities. See Welzel (2013) for further details.

The results are in Table 3. Column (1) reports the first-stage regression, and shows a significant negative association between emancipative values and confidence in government. This is consistent with previous studies linking values of emancipation with a critical view of authority (Welzel and Inglehart 2010). Columns (2)–(4) report the second-stage regression, with confidence in government instrumented by cohort-country emancipative values and with each column reporting a different measure of compliance (justifiability to evade taxes, willingness to fight for one’s country, and a compliance index that is the principal component analysis score of both measures). We consistently find that higher confidence in government is correlated with greater levels of compliance, either in the form of less support for tax evasion, or more willingness to fight for one’s country.

Although only suggestive, these results do show a robust empirical pattern between compliance and trust in government.

## 6.2 Policy choice

Proposition 4 predicts that government will make greater use of voluntary compliance for policies in high trust environments. The COVID-19 pandemic provides an interesting context to think about these arguments given that heavy use was made of voluntary compliance via social distancing, vaccine uptake and wearing face coverings. We would expect countries with stronger trust to use more voluntary compliance. For this, we draw on evidence from a group of European countries covered in a new dataset CoronaNet<sup>19</sup> which documents policies implemented during the COVID-19 pandemic, differentiating those that used coercive compliance versus those that did not. We use the data exclusively from Europe and the US. Of course, looking at these broad country patterns is at best illustrative of the ideas in the model rather than providing compelling evidence of a causal link between trust and the use of voluntary measures.

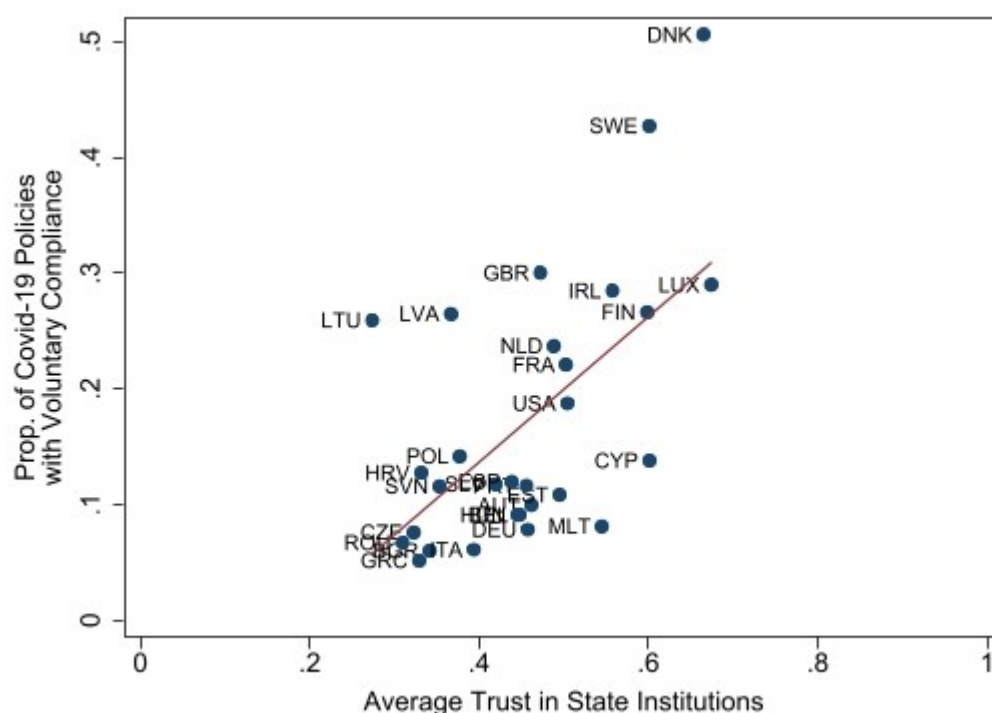
Figure 2 graphs the proportion of COVID-19 policies that were implemented with voluntary compliance against the trust principal component described above which is constructed from the IVS. There is a clear upward sloping relationship between the two variables. At the top right of Figure 2 are Denmark and Sweden which have both high levels of trust and high proportions of voluntary-compliance-based COVID-19 policies. Many of the low trust countries in Eastern Europe did not use voluntary compliance, along with Italy, another country with low trust. This provides suggestive evidence of one of the core ideas in the model.

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<sup>19</sup> See <https://www.coronanet-project.org/>.



Figure 2: The cross-country relationship between trust and COVID-19 policies that use voluntary compliance



Source: authors' calculation based on CoronaNet.

### 6.3 Discussion

The empirical analysis presented here is intended to breathe life into the theoretical ideas. It makes use of the fact that there is plentiful survey evidence on trust in government. One of the challenges is to find ways of identifying causal relationships. Authors like Martinez-Bravo and Sanz (2022) have been exploring the potential for randomized experiments to offer insights. Additionally, it would be useful to find ways to isolate mechanisms which link compliance and trust in innovative ways. We have presented here a series of suggestive evidence based on both international survey data and a UK panel during COVID-19, highlighting the link between trust in government and willingness to comply.

## 7 Concluding comments

This paper has suggested an approach for studying the link between compliance and trust in government. We have argued that this provides a different way of thinking about state-capacity building, and is in line with recent evidence of non-coercive relations between states and citizens. We have also linked it to the literature on trust building, both institutional and cultural. We have also found evidence consistent with the view that trust and compliance are linked. Many have looked at correlates of political trust and there has been concern voiced about its decline, especially in established democracies. The framework suggested in this paper links this to tangible consequence in terms of state effectiveness and articulates the link between trust and policy-making.

The model is simple and there is much to be done to move an agenda forward that links trust to policy-making more directly. In the model, the only source of information about the underlying state comes from observing policy, but there is interesting work to be done on how institutions of government play a role in building trust which fosters compliance. This could include having a role for independent advice.

One major step forward would be to develop dynamic models where the trust and policy processes co-evolve along with institutions. Only then we will have the framework that is needed to address legitimate concerns about trust changing over time. It will also provide better insights into the ways in which trust can be built alongside state capacities. For, if building political trust is an issue, we need to understand its policy consequences to have a full grasp on the issues that this raises.

But the challenge posed here is not just academic. Governments constantly grapple with policy problems with limited power to coerce in a way that limits state capacity in some domains. The analysis presented here stresses that convincing citizens that government is indeed acting in their best interests could be an asset that pays dividends in policy terms. And we have also provided a direct link between this and measures of welfare.

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## Appendix

### A Proofs of results

**Proof of Proposition 1** This follows immediately by noting that (9) is increasing in  $\gamma$ ,  $\hat{\Delta}(x)$  is increasing in  $x$ , and (10) is increasing in  $\hat{\Delta}$ .

**Proof of Proposition 2** To see this note that the equilibrium policy of a trustworthy government is to set  $\lambda = 1$  if and only if

$$W(\varphi, \hat{\rho}(\hat{\Pi}^1(\gamma), \varphi) : 1) \geq 0.$$

The first case just says that a trustworthy government will never implement a policy when  $\theta = 0$ , since  $W(\varphi, \rho : 0) < 0$  for all  $\rho \in [0, 1]$ . So trustworthy government will never implement the policy when  $\theta = 0$ . Since  $\hat{\Pi}^1(0) = \underline{\pi}$ , then if  $W(\varphi, \hat{\rho}(\underline{\pi}, \varphi) : 1) \geq 0$ , a trustworthy government sets  $\lambda = 1$ . If  $W(\varphi, \hat{\rho}(\Pi^1(\gamma), \varphi) : 1)$  is increasing in  $\gamma$ , then we will have  $\lambda = 1$  for all  $\gamma \geq 0$ . To see that this is the case note that, at an interior solution for compliance, then

$$\begin{aligned} \frac{\partial W(\varphi, \hat{\rho}(\hat{\Pi}^1(\gamma), \varphi) : 1)}{\partial \gamma} &= [\Delta - E\rho + \varphi] \frac{\partial \hat{\rho}}{\partial \pi} \cdot \frac{\partial \hat{\Pi}^1(\gamma)}{\partial \gamma} \\ &= [\Delta - \hat{\Delta}(\Pi^1(\gamma))] \frac{\partial \hat{\rho}}{\partial \pi} \cdot \frac{\partial \hat{\Pi}^1(\gamma)}{\partial \gamma} > 0 \end{aligned}$$

using

$$\hat{\rho} = \frac{\hat{\Delta}(\Pi^1(\gamma)) + \varphi}{E}.$$

Part 2 of the proposition now holds since we have assumed that  $W(\varphi, \hat{\rho}(1, \varphi) : 1) > 0$ , then, using the intermediate value theorem, since  $W(\varphi, \hat{\rho}(\Pi^1(\gamma), \varphi) : 1)$  is increasing, there exists  $\hat{\gamma}$  such that  $W(\varphi, \hat{\rho}(\hat{\Pi}^1(\hat{\gamma}), \varphi) : 1) = 0$ .

**Proof of Proposition 3** Let  $\chi_1 = \pi(\gamma + (1 - \gamma)\beta)$  and  $\chi_2 = (1 - \pi)(1 - \gamma)(1 - \beta)$ . Differentiating (11) with respect to  $\gamma$  yields:

$$\begin{aligned} \hat{W}_\gamma(\gamma, \varphi) &= [\pi(1 - \beta)W(\varphi, \hat{\rho}(\hat{\Pi}^1(\gamma), \varphi) : 1) \\ &\quad - (1 - \pi)\beta W(\varphi, \hat{\rho}(\hat{\Pi}^1(\gamma), \varphi) : 0)] \\ &\quad + \chi_1 W_\gamma(\varphi, \hat{\rho}(\hat{\Pi}^1(\gamma), \varphi) : 1) + \chi_2 W_\gamma(\varphi, \hat{\rho}(\hat{\Pi}^1(\gamma), \varphi) : 0). \end{aligned}$$

The first term in square brackets is unambiguously positive since  $W(\varphi, \hat{\rho}(\hat{\Pi}^1(\gamma), \varphi) : 0) < 0$ . The term on the third line is zero if either  $\hat{\rho} = 0$  or  $\hat{\rho} = 1$  since then  $\partial \rho / \partial \gamma = 0$ . In this case  $\hat{W}_\gamma(\gamma, \varphi) > 0$ . At an interior solution the term on the third line is

$$\begin{aligned} \frac{\partial \rho}{\partial \gamma} \chi_1 [\Delta - \hat{\Delta}(\hat{\Pi}^1(\gamma))] + \chi_2 [-\delta - \hat{\Delta}(\Pi^1(\gamma))] \\ = \frac{1}{E} (\chi_1 \Delta^1 - \chi_2 \delta - [\chi_1 + \chi_2] \hat{\Delta}(\Pi^1(\gamma))) = 0, \end{aligned}$$

using the fact that

$$\hat{\Pi}^1(\gamma) = \frac{\chi_1}{\chi_1 + \chi_2}.$$

So welfare always increases with trust.

**Proof of Proposition 4** The first key observation is that  $W(\gamma, \varphi)$  is convex in  $\rho$ . To see this, there are two cases. Note that

$$\begin{aligned}\hat{W}_\varphi(\varphi, \gamma) &= \chi_1 \left[ [\Delta - E\rho + \varphi] \frac{\partial \rho}{\partial \varphi} - (1 - \rho) \right] \\ &\quad + \chi_2 \left[ [-\delta - E\rho + \varphi] \frac{\partial \rho}{\partial \varphi} - (1 - \rho) \right],\end{aligned}$$

where  $\chi_1$  and  $\chi_2$  are defined in the proof of Proposition 3. We can write this as

$$[\chi_1 \Delta - \chi_2 \delta] \frac{\partial \rho}{\partial \varphi} - (\chi_1 + \chi_2) \left[ [E\rho - \varphi] \frac{\partial \rho}{\partial \varphi} + (1 - \rho) \right].$$

At a non-interior solution,  $\hat{\rho} = 0$  or  $\hat{\rho} = 1$ , then  $W_{\varphi\varphi}(\gamma, \varphi) = 0$ , and at an interior solution, then  $\partial \rho / \partial \varphi = 1/E$  and then  $W_{\varphi\varphi}(\gamma, \varphi) = (\chi_1 + \chi_2)/E > 0$ . Hence, since we are maximizing a convex function, (12) must have an extremal solution. There are two cases. If  $1 > \hat{\Delta}(\Pi^1(\gamma)) > 0$ , then if

$$\begin{aligned}& [\chi_1 \Delta - \chi_2 \delta] \frac{\partial \rho}{\partial \varphi} - (\chi_1 + \chi_2) \left[ \hat{\Delta}(\Pi^1(\gamma)) \frac{\partial \rho}{\partial \varphi} + (1 - \rho) \right] \\ &= \frac{[\chi_1 \Delta - \chi_2 \delta]}{E} - (\chi_1 + \chi_2) \left[ \left( 1 - \frac{\hat{\Delta}(\Pi^1(\gamma))}{E} \right) \right] > c,\end{aligned}$$

we have  $\hat{\varphi}(\gamma) = E - \hat{\Delta}(\hat{\Pi}^1(\gamma))$  and  $\hat{\varphi}(\gamma) = 0$ , otherwise. Note that with  $\hat{\varphi}(\gamma) = E - \hat{\Delta}(\hat{\Pi}^1(\gamma))$ , then  $\hat{\rho}(\hat{\Pi}^1(\gamma), \varphi) = 1$ . Also note that

$$\frac{\partial \hat{\varphi}(\gamma)}{\partial \gamma} = -\frac{\partial \hat{\Pi}^1(\gamma)}{\partial \gamma} (\Delta + \delta) < 0.$$

Now note that

$$\hat{W}(0, \gamma) = \hat{\rho}(\hat{\Pi}^1(\gamma), 0) [\chi_1 \Delta - \chi_2 \delta] - (\chi_1 + \chi_2) \frac{E}{2} (\hat{\rho}(\hat{\Pi}^1(\gamma), 0))^2$$

and

$$\hat{W}(E - \hat{\Delta}(\hat{\Pi}^1(\gamma)), \gamma) = [\chi_1 \Delta - \chi_2 \delta] - (\chi_1 + \chi_2) \frac{E}{2} - c [E - \hat{\Delta}(\hat{\Pi}^1(\gamma))]$$

when the government relies on coercion. Now suppose that we let  $\gamma \rightarrow 1$ .

$$\hat{W}(0, 1) = \pi \frac{\Delta^2}{2E} > \hat{W}(E - \hat{\Delta}(\hat{\Pi}^1(1)), 1) = \pi \left[ \Delta - \frac{E}{2} \right] - c [E - \Delta].$$

So voluntary compliance is always optimal when trust is very high. Now let  $\gamma \rightarrow 0$ . We then have:

$$\hat{W}(0, 0) = \beta \left[ \hat{\rho}(\underline{\pi}, 0) \hat{\Delta}(\underline{\pi}) - \frac{E}{2} (\hat{\rho}(\underline{\pi}, 0))^2 \right]$$

and

$$\hat{W}(E - \hat{\Delta}(\underline{\pi}), 0) = \beta \left[ \hat{\Delta}(\underline{\pi}) - \frac{E}{2} \right] - c [E - \hat{\Delta}(\underline{\pi})]$$

Note that if  $\hat{\Delta}(\underline{\pi}) < 0$ , then  $\hat{W}(0, 0) = 0$  and  $\hat{W}(E - \hat{\Delta}(\underline{\pi}), 0) < 0$ , so voluntary compliance is trivially optimal. So a necessary condition for coercive compliance to dominate is that  $\hat{\Delta}(\underline{\pi}) > 0$  and  $\hat{W}(E - \hat{\Delta}(\underline{\pi}), 0) > \hat{W}(0, 0)$ , which boils down to the condition

$$\beta \left[ \hat{\rho}(\underline{\pi}, 0) \hat{\Delta}(\underline{\pi}) - \frac{E}{2} (\hat{\rho}(\underline{\pi}, 0))^2 \right] < \beta \left[ \hat{\Delta}(\underline{\pi}) - \frac{E}{2} \right] - c [E - \hat{\Delta}(\underline{\pi})].$$